SciLifeLab

Instructions: *Use Times New Roman font size 11, 1.0 pt text space, and* ***maximum three A4 pages****, including any figures.*

Name or type of instrument	**10X Chromium Connect or equivalent liquid handler**
Unit	ESCG
Platform	SSCB/Genomics
Applicant (Head of Unit)	Anja Mezger
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Instrument, acquisition cost (kSEK)	3600
Funding applied for (kSEK)	2600

Description of the instrument

Describe the instrument, its purpose, and its specific capabilities. If possible, provide a link to a web page describing the type of instrument. Does the instrument represent a new technology at the unit, or is it a replacement/upgrade of current equipment base? Is the instrument unique in terms of service to users nationally?

Today, we offer two main technologies at the single cell facility, droplet-based sequencing using the 10X Genomics technology and plate-based sequencing using SmartSeq3. While the workflow for SmartSeq3 is already automated, we do not have any automation in place for our droplet-based workflow. Existing automatic liquid handlers cannot be used for 10X Genomics as they do not have any free capacity. Thus, we would like to acquire a Chromium Connect instrument from 10X Genomics (or equivalent liquid handler) to automate our droplet-based workflow.

This instrument automates the single cell workflow and efficiently generates sequencing-ready libraries from a single cell suspension with minimal hands-on time. The instrument is based on a Hamilton pipetting robot and allows batch processing of up to 8 samples. Our most requested assays from 10X Genomics are already installed on the Connect and 10X Genomics periodically updates the software to include an increasing number of assays. The Connect is flexible: it can run fully automated from droplet generation to library generation, or it can be used to prepare libraries from samples that were initially run manually on the Chromium Controller. The Chromium Connect allows full walk-way automation. Sequencing ready libraries can be produced in just one day, whereas it takes, depending on the protocol, at least 2-3 days if the whole protocol is run manually.

The service is not unique on a national level, however due to the requirement of fresh samples, it is necessary that single cell sequencing using 10X Genomics' technology is offered at several nodes. The instrument price includes installation, training, preventative maintenance, and a 24-month warranty on the instrument.

Link for to the instrument: https://www.10xgenomics.com/instruments/chromium-connect

Statement of need

Describe how the instrument will be crucial for the operations, productivity, development, and competitiveness of your unit. Estimate the need and impact of the instrument from a user perspective. Will the instrument be shared with or used by other units or research groups at SciLifeLab? Also, describe any co-funding plans.

The requested instrument enables full walk-away automation of our single cell sequencing workflow (10X Genomics) with minimal hands-on time, and thus, basically adds almost one full FTE to our team. Between 2021 and now, we were able to accept 51 projects with a total of 235 individual samples. However, we had to decline a lot of project requests due to insufficient sample processing capacity. The Connect will significantly increase our capacity for processing droplet-based sample prep and we will be able to meet the large demand of user projects.

Today, we go through the workflow manually which, besides being laborious, can introduce variance and thus, decreasing the quality of the sequencing data. Full automation will allow us to decrease technical variance to a minimum and thus, generating reproducible and consistent results.

Another advantage of having an automated solution for library prep, is that it will enable users to drop off samples late in the afternoon to start their single cell run. This is especially important to clinical researchers that handle samples from surgeries which can come in at any time of the day. At the moment, we can only accept samples until 13.30, as our staff is required to be on-site for about 3 hours for initial sample processing until a safe stop point is reached. With the Chromium Connect, samples can be started on the instrument with minimal hands-on time and run overnight. Without any automation, many clinical samples cannot be processed and thus, valuable samples are lost as these can often not be preserved for later sample processing.

The Chromium Connect records automatically lot numbers of all 10X Genomics' supplied reagents, thus simplifying tracking lot-to-lot variations and entering this information into our LIMS system for good traceability.

Adding an automated liquid handler to our operations would revolutionize our droplet-based single cell workflow. It would enable our unit to significantly increase our sample processing throughput, decrease errors and variability and freeing up time that can be used for technology development to ensure that ESCG will stay at the forefront of single cell research. Thus, purchasing a liquid handler will directly benefit our users that are interested in droplet-based single cell assays.